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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/668,875

09/23/2003

Sean Christopher Erickson

03-1091

3616

7590

05/13/2005

LSI Logic Corporation  
Legal Department - IP  
MS D-106  
1621 Barber Lane  
Milpitas, CA 95035

EXAMINER

EASTHOM, KARL D

ART UNIT

PAPER NUMBER

2832

DATE MAILED: 05/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/668,875

Applicant(s)

ERICKSON ET AL. 

Examiner

Karl D. Easthom

Art Unit

2832

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 April 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 10-19 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 and 20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |                                                                                                                        |                                                                                         |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                                                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____                                                |

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 20 are rejected under 35 U.S.C. 102(b) as anticipated by Gray (6087193). or, in the alternative, under 35 U.S.C. 103(a) as obvious over Gray (6087193) in view of Hayama (5260595). Gray discloses the claimed subject matter at Figs. 26 with first and second contact regions 140, and 110/120, substrate the P substrate, the diffusion region in the EPI layer, third contact 150. The Schottky diode or barrier is 57: The depletion region and change in resistance is disclosed at col. 8. Diffusion is disclosed in general at col. 8, lines 50-62, or col. 10, lines 1-15, as a method for forming all the disclosed devices so that diffusion is contemplated for the regions at Fig. 26 to form a diffusion resistor. The device of Fig. 26 is expected to have the same manner of operation as that of Fig. 24, which is a variable resistor, since the depletion region changes and changes the resistance of the device, as noted at col. 8. As an alternative, where the Gray Fig. 26 embodiment resistor is not a diffusion resistor, Hayama discloses diffusion resistors to minimize the effects of radiation noise at cols. 1-2 generated in the depletion region, so that it would have been obvious to employ a

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diffusion resistor where the depletion type resistors are disclosed in both references and diffusion is well known as one method of forming semiconductor type resistors. In claim 20, elements 380 or 390, which are the diffusion resistors of Gray are connected to inputs and outputs of driver circuit 360. Or vice versa, 360 is connected to the input and output of 380, 390.

4. Claims 3, and 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gray (6087193) (with Hayama above as necessary), in view of Bhatia et al. (4426655). Gray discloses the claimed invention as noted above except the tungsten metal and p-type substrate. Bhatia discloses at top of col. 3 using many metals including tungsten as useful for forming Schottky diodes as having the correct barrier so that it would have been obvious to employ that metal where Gray discloses metal contacts in general. Bhatia at Fig. 1 and Gray at Fig. 25 each discloses p-type substrates for forming variable resistors so that it would have been obvious to employ the known type of substrate in a semiconductor device where there are limited types, n, p or insulating, etc. In claim 5, the contacts are n+ in Gray. In claim 6 the metal is seen as hatched metal.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gray (6087193) (with Hayama above as necessary), in view of Kluth (6521515). The claimed invention is disclosed as noted except the salicided regions. Kluth at col. 1, lines 30-50 discloses such regions for forming contacts for the purpose of defining the contact regions with a low resistivity so that the method and product thereby would have been obvious. There is a desire for low resistivity because the drain 120 with emitter 110 includes metal and semi-metal, which includes salicides, for the contact, col. 9, lines 10-20, and one possibility mentioned is a superconductor, which suggests low conductivity.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gray (6087193) (with Hayama above as necessary), in view of Racanelli et al. (5,532,175). The claimed invention is disclosed as noted except the silicon on insulator substrate. Racanelli at col. 1, lines 5-20 discloses a host of advantages for such sol technology such as increased speed and density and reduced process steps for forming such devices so that such as substrate would have been obvious.

Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gray (6087193) (with Hayama above as necessary), in view of Yu (2004/0075146). The claimed invention is disclosed as noted except the doping levels. Yu discloses at par. 37 that typical doping levels for contacts labeled N+, and N regions are in the claimed range in order to render the contact regions and resistive regions correctly conductive such that such levels would have been obvious where Gray employs the similarly labeled N and N+ regions obvious to one of skill in the art as higher and lower concentrations as noted. For claim 8, "about 1E15" is met by 1E16 or rendered obvious thereover since a lower concentration obviously renders a higher resistance, where P levels are disclosed by Yu in the claimed range and N indicates or suggests a lower doping level than N+.

3. Applicant's arguments filed 4/5/4 have been fully considered but they are not persuasive. Applicant states that 120 is not a contact. This is not correct. The element is an n+ ohmic contact, just like the ohmic contact 137, or the contact 110 is made of metal. Because it may also be used as an emitter does not mean it is not a contact. The device has the same structure as that of applicant, and is expected to

behave the same way, so that there is no hybrid creation. It is a variable resistor because the channel region must change when the voltage changes on the gate, just like that of applicant, and like that of Fig. 24, or like FET transistors in general. If applicant has evidence to the contrary, applicant must point out what structural differences of Gray are different from his claimed invention. Fig. 24 is similar to the Fig. 26 device, the former without the Schotky barrier. The Schotky barrier is expected to behave the same as the oxide gate which specifically is described as a variable resistor for Fig. 24, due to the depletion region formed, controlling the width of the channel and hence the resistance, see col. 8. For claim 5, applicant is correct that it should have been grouped with claim 3. As to the resistor not being a diffusion resistor, this is not correct as noted above. Basically, col. 10, lines 5-15, and col. 10, lines 55-60, states that the embodiments are created by employing either diffusion or ion implantation. Thus doping is disclosed as created by either method so that the first method results in a diffusion resistor. Applicant argues that the contacts are not metal, because the examiner mistakenly termed the insulator 180 a contact. This is not persuasive since the metal contacts are as noted and clearly seen in Fig. 26 as noted above. As to claim 2, the motivation is supplied by the art of record as noted above, and there is no legal requirement that Gray provides it. Nonetheless, Gray provides a desire for low resistivity because the drain 120 with emitter 110 is metal, col. 9, lines 10-20, and semimetals, which includes salicides, and another possibility mentioned is a superconductor, which might be the best suggestion for low conductivity known. Similar remarks apply to claim 4, with the motivation supplied as noted. As to claims

8-9, about 10exp15 is met by 10exp16 since about is broad. Gray discloses diffusion, and the concentrations are disclosed and motivated by Hayama as noted. It is well known by first year semiconductor students that the doping concentration controls the resistivity.


4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karl D. Easthom whose telephone number is (571) 272-1989. The examiner can normally be reached on M-Th, 5:30AM-4:00PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Elvin Enad can be reached on (571) 272-1990. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Karl D Easthom  
Primary Examiner  
Art Unit 2832

KDE